NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.1: Chapter 4 of Class 10 Maths, **Quadratic Equations**, introduces students to equations. Exercise 4.1 focuses on understanding the standard form of quadratic equations and identifying whether a given equation is quadratic.

This exercise helps build foundational concepts by encouraging students to rewrite and simplify equations to identify their degree. The NCERT solutions provide clear step-by-step explanations, ensuring students grasp the methods to check for quadratic forms. Mastery of this exercise is crucial for solving quadratic equations effectively in later exercises.

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.1 Overview

Chapter 4 of Class 10 Maths, Quadratic Equations, focuses on understanding equations. Exercise 4.1 emphasizes identifying quadratic equations, laying the groundwork for solving them in subsequent exercises.

This exercise is important as it helps students develop a strong conceptual understanding of quadratic equations, their structure, and how they differ from linear or cubic equations. Mastery of these concepts is essential for tackling real-world problems involving quadratic relationships and for excelling in advanced topics in mathematics, including coordinate geometry and calculus.

NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.1 Quadratic Equations

Below is the NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.1 Quadratic Equations -

1. Check whether the following are quadratic equations:

(i) $(x + 1)^2 = 2(x – 3)$

(ii) $x^2 – 2x = (–2) (3 – x)$

(iii) $(x – 2)(x + 1) = (x – 1)(x + 3)$

(iv) $(x – 3)(2x +1) = x(x + 5)$

(v) $(2x – 1)(x – 3) = (x + 5)(x – 1)$

(vi) $x^2 + 3x + 1 = (x – 2)^2$

(vii) $(x + 2)^3 = 2x(x^2 - 1)$

(viii) $x^3 - 4x^2 - x + 1 = (x - 2)^3$

Solutions:

(i) Given,

$(x + 1)^2 = 2(x - 3)$

By using the formula for $(a+b)^2 = a^2 + 2ab + b^2$

$\Rightarrow x^2 + 2x + 1 = 2x - 6$

$\Rightarrow x^2 + 7 = 0$

The above equation is in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is a quadratic equation.

(ii) Given, $x^2 - 2x = (-2)(3 - x)$

$\Rightarrow x^2 - 2x = -6 + 2x$

$\Rightarrow x^2 - 4x + 6 = 0$

The above equation is in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is a quadratic equation.

(iii) Given, $(x - 2)(x + 1) = (x - 1)(x + 3)$

By multiplication

$\Rightarrow x^2 - x - 2 = x^2 + 2x - 3$

$\Rightarrow 3x - 1 = 0$

The above equation is not in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is not a quadratic equation.

(iv) Given, $(x - 3)(2x + 1) = x(x + 5)$

By multiplication

$\Rightarrow 2x^2 - 5x - 3 = x^2 + 5x$

$\Rightarrow x^2 - 10x - 3 = 0$

The above equation is in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is a quadratic equation.

(v) Given, $(2x - 1)(x - 3) = (x + 5)(x - 1)$

By multiplication

$\Rightarrow 2x^2 - 7x + 3 = x^2 + 4x - 5$

$\Rightarrow x^2 - 11x + 8 = 0$

The above equation is in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is a quadratic equation.

(vi) Given, $x^2 + 3x + 1 = (x - 2)^2$

By using the formula for $(a-b)^2 = a^2 - 2ab + b^2$

$\Rightarrow x^2 + 3x + 1 = x^2 + 4 - 4x$

$\Rightarrow 7x - 3 = 0$

The above equation is not in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is not a quadratic equation.

(vii) Given, $(x + 2)^3 = 2x(x^2 - 1)$

By using the formula for $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

$\Rightarrow x^3 + 8 + x^2 + 12x = 2x^3 - 2x$

$\Rightarrow x^3 + 14x - 6x^2 - 8 = 0$

The above equation is not in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is not a quadratic equation.

(viii) Given, $x^3 - 4x^2 - x + 1 = (x - 2)^3$

By using the formula for $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

$\Rightarrow x^3 - 4x^2 - x + 1 = x^3 - 8 - 6x^2 + 12x$

$\Rightarrow 2x^2 - 13x + 9 = 0$

The above equation is in the form of $ax^2 + bx + c = 0$.

Therefore, the given equation is a quadratic equation.

2. Represent the following situations in the form of quadratic equations:

(i) The area of a rectangular plot is 528 m². The length of the plot (in metres) is one more than twice its breadth. We need to find the length and breadth of the plot.

(ii) The product of two consecutive positive integers is 306. We need to find the integers.

(iii) Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. We would like to find Rohan's present age.

(iv) A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken

Solutions:

(i) Let us consider,

The breadth of the rectangular plot = x m

Thus, the length of the plot = (2x + 1) m

As we know,

Area of rectangle = length × breadth = 528 m²

Putting the value of the length and breadth of the plot in the formula, we get

(2x + 1) × x = 528

$\Rightarrow 2x^2 + x = 528$

$\Rightarrow 2x^2 + x - 528 = 0$

Therefore, the length and breadth of the plot satisfy the quadratic equation, $2x^2 + x - 528 = 0$, which is the required representation of the problem mathematically.

(ii) Let us consider,

The first integer number = x

Thus, the next consecutive positive integer will be = x + 1

Product of two consecutive integers = x × (x +1) = 306

⇒ $x^2 + x = 306$

⇒ $x^2 + x - 306 = 0$

Therefore, the two integers, x and x+1, satisfy the quadratic equation, $x^2 + x - 306 = 0$, which is the required representation of the problem mathematically.

(iii) Let us consider,

Age of Rohan's = x years

Therefore, as per the given question,

Rohan's mother's age = x + 26

After 3 years,

Age of Rohan's = x + 3

Age of Rohan's mother will be = x + 26 + 3 = x + 29

The product of their ages after 3 years will be equal to 360, such that

(x + 3)(x + 29) = 360

⇒ $x^2 + 29x + 3x + 87 = 360$

⇒ $x^2 + 32x + 87 - 360 = 0$

⇒ $x^2 + 32x - 273 = 0$

Therefore, the age of Rohan and his mother satisfies the quadratic equation, $x^2 + 32x - 273 = 0$, which is the required representation of the problem mathematically.

(iv) Let us consider,

The speed of the train = x km/h

And

Time taken to travel 480 km = 480/x km/hr

As per second condition, the speed of train = $(x - 8)$ km/h

Also given, the train will take 3 hours to cover the same distance.

Therefore, time taken to travel 480 km = (480/x)+3 km/h

As we know,

Speed × Time = Distance

Therefore,

$(x – 8)(480/x) + 3 = 480$

$\Rightarrow 480 + 3x – 3840/x – 24 = 480$

$\Rightarrow 3x – 3840/x = 24$

$\Rightarrow x^2 – 8x – 1280 = 0$

Therefore, the speed of the train satisfies the quadratic equation, $x^2 – 8x – 1280 = 0$, which is the required representation of the problem mathematically.

Benefits of Using NCERT Solutions for Class 10 Maths Chapter 4 Exercise 4.1 Quadratic Equations

Conceptual Clarity: The solutions provide step-by-step explanations, helping students understand the structure and properties of quadratic equations.

Accurate Answers: Verified solutions ensure accuracy, minimizing errors during practice.

Time Management: Simplified methods help students solve problems efficiently, saving time in exams.

Exam Focused: The solutions align with the CBSE syllabus and exam pattern, covering important concepts.

Foundation Building: Mastery of these basics aids in solving advanced mathematical problems in higher studies.

Convenience: Easily accessible, these solutions provide a reliable resource for self-study and quick revisions.